Reliable Data Communication
Remote Access

Meeting harsh environmental challenges

westermo

www.westermo.com

Save Time and Money with Secure Remote Connections Worldwide

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The ability to create remote connections to equipment can offer companies great savings both in time and money. Not only this, but improved customer service can also be offered. It is possible to control, monitor, update software or fault find, irrespective of where the equipment is located, by means of a simple remote connection.

Being able to connect to a remote server whilst working from home or using a laptop PC when traveling makes for much more efficient and flexible working conditions for many support engineers.

Why use industrial products?

Westermo designs and develops products for use in industrial applications and environments with high interference levels. With over 30 years of experience we are fully conversant with the market's need for reliability and functionality, where a product is expected to work faultlessly for many years.

These are some of the factors that we consider when we develop a new product to provide an optimal final cost.

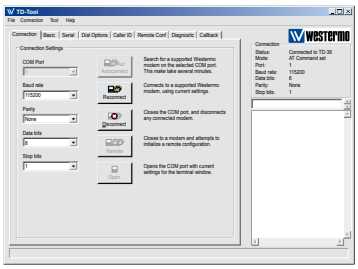
Over 100 000 modems in use worldwide

Our wide range of telephone modems and ISDN adapters are designed for industry and are the natural choice for reliable remote applications in harsh environments.

Some of the key reasons for the success of our modems are listed below.

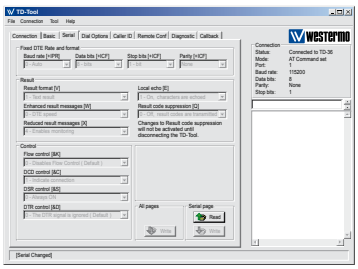
- Extended temperature range –25°C to +70°C
- Data rate up to 33.6 kbit/s with fast connect
- Terminal rate up to 115.2 kbit/s
- 2-/4-wire leased line
- V.23 FDX/HDX with multidrop
- DTR and incoming data dialling
- DIP-switch configuration
- Secure call back and access
- Dial backup for leased line using PSTN
- Up to 11 data bits
- Tri-galvanic isolation (interface/line/supply)
- RS-422 / RS-485 interface. Digital I/O
- Caller ID presentation and answering
- Remote configuration

TD-Tool and IDW-Tool
The Easy way to Configure Modems



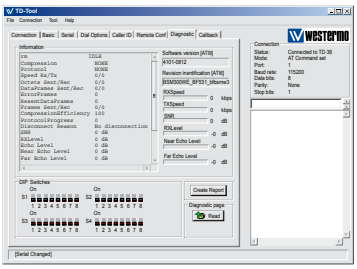
TD- and IDW-Tool offers two ways to configure the modems. Either using the terminal window with AT-commands or using the tool with its scroll down menus.

Establish a serial connection with the modem and start the tool. Click either Autoconnect or Reconnect and the tool will automatically download the present configuration.

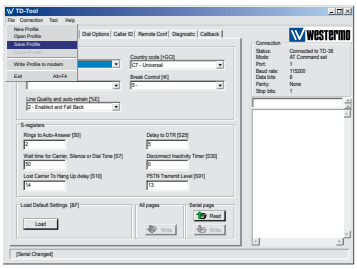


The tool offers several configuration menus:

- Connection
- Basic
- Serial
- Dial options
- Caller ID
- Remote Configuration
- Diagnostic
- Callback



The *Diagnostic* tab is an invaluable option for a support technician as it shows all the vital information about the current connection allowing faults to be rapidly diagnosed.



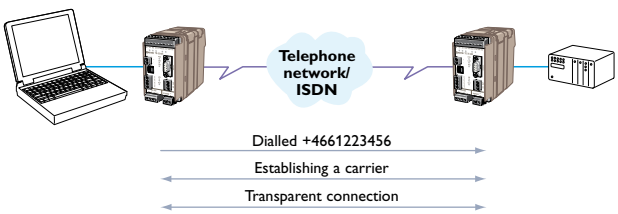
The option to save a configuration file is ideal for systems builders who work with different types of PLCs. Once a working configuration has been created for an application a configuration file can be saved on the PC and downloaded into another modem in a future project.

Note! TD-Tool is not required for the TD-23 and TD-29.

Analogue circuits
Connection times between modems are between 15 – 25 seconds.

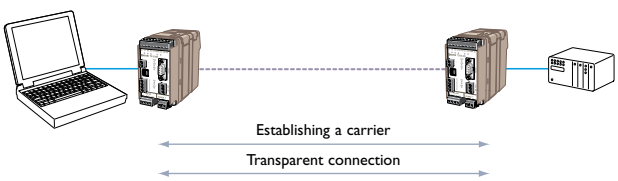
The most common form of remote connection is via the analogue telephone network. The telecommunication circuit is provided by a telecom provider. Dial up, Leased line and multidrop circuits are available.

Dial-up connection – PSTN (Public Switched Telephone Network)
A piece of equipment (e.g. PC, PLC) initiates the PSTN modem so that a connection is established to another PSTN modem by calling its telephone number. The receiving modem answers the call and establishes a carrier. Once the connection has been established between the modems you then have a transparent connection via the serial ports on the modems.



Leased line
A leased line can either be a point-to-point, or a multidrop connection. Multidrop is described in its own section.

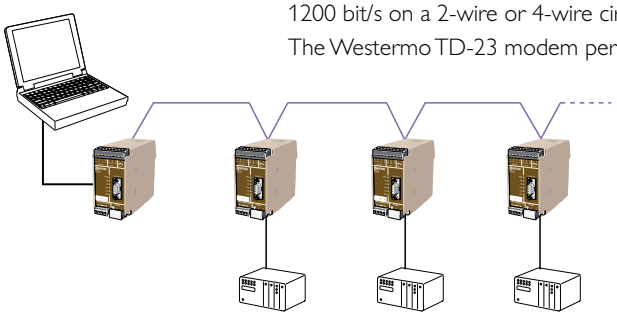
Unlike a dial-up connection you have a permanently connected circuit between two points via a 2-/or 4-wire line. This connection can be routed through exchanges or just be a direct cable connection. One modem is configured as the dialling modem and the other the answering modem. Once the connection has been established at power up data can be continuously transferred.



In the event of a power failure on one of the modems the connection is automatically re-established as soon as the power returns. Modems for leased lines can also be used on private lines.

Multidrop (V.23)

When it is necessary to connect many devices onto the same circuit multidrop lines can be used. V.23 is an old multidrop standard that was used at 600 or 1200 bit/s on a 2-wire or 4-wire circuits.



The Westermo TD-23 modem permits all rates up to 1200 baud. It is also possible to adjust the transmission power levels and receiver sensitivity of the modem, which means the modem can be used in many applications.

It is possible to have up to 16 drop points at a transmission distance of up to 25 km (15.5 miles).

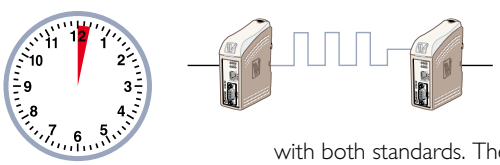
Multidrop (Dedicated lines)

Westermo also has multidrop modems for dedicated lines. Products that use the Westermo 10 mA current loop as a transfer interface are described in more detail in the "Local Data Communication" brochure.

The TD-29 is an FSK modem like the TD-23 but requires more bandwidth. Data transfer rates of up to 19.2 kbit/s are possible and up to 10 drop points over a distance of up to 10 km (6.2 miles) can be connected. The TD-29P is specially adapted for equipment using the PROFIBUS protocol, more details in PROFIBUS brochure..

ISDN

(Integrated Services Digital Network)



ISDN is a digital equivalent to the standard analogue telephone network (PSTN). There are two different standards on the European market, the French VN4 system and DDS1 which applies in the rest of Europe. The Westermo IDW-90 adapter works with both standards. The two main advantages of ISDN compared to analogue technology is the connection time, which is usually less than 2 seconds, and the data transfer rate of up to 128 kbit/s.

Telephone Modems

ISDN Adapter

Multidrop Modems

- Extended temperature range –25°C to +70°C
- Data rate up to 33.6 kbit/s with Fast Connect
- Terminal rate up to 115.2 kbit/s
- 2-wire leased line
- V23 HDX with multidrop
- DTR and incoming data dialling
- DIP-switch configuration
- Watchdog
- Secure call back and access
- Industrial environment transient protection on all interfaces
- Up to 11 data bits
- Tri-Galvanic isolation (interface/line/supply)
- Caller ID presentation and answering
- Remote configuration

TD-36

Telephone modem, RS-232

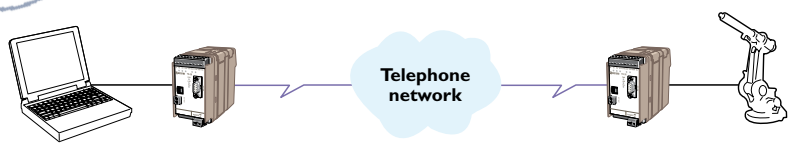
The TD-36 is designed to function reliably within industrial environments and in areas of high level interference. The modem has an RS-232 interface supporting terminal data rates up to 115 kbit/s. The TD-36 is a V.34 modem meaning that it can support bidirectional data rates of up to 33.6 kbit/s on the PSTN or leased line side. Fast connect ensures that leased lines can re-establish connections in the range of 5 seconds.

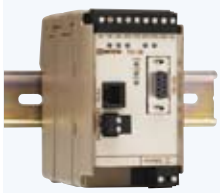
The modem is equipped with transient protection on the line side and a "watchdog" that monitors and automatically resets the modem in the event of a fault. These functions together with remote configuration make the modem perfect for installation at unmanned sites and prevent the need of costly service trips.

The modem also has password protection, dial-back security and caller ID answering to ensure that only authorised users can communicate with the modem and any connected equipment.

The TD-36 is ideal for industrial applications as it mounts easily on to a 35 mm DIN-rail, has screw terminal connections and is tri galvanically isolated.

For ease of setup the modem is supported by the Westermo TD-tool configuration software but also has DIP switches to assist configuration. Drivers for Windows setup are also supplied.





TD-36 485

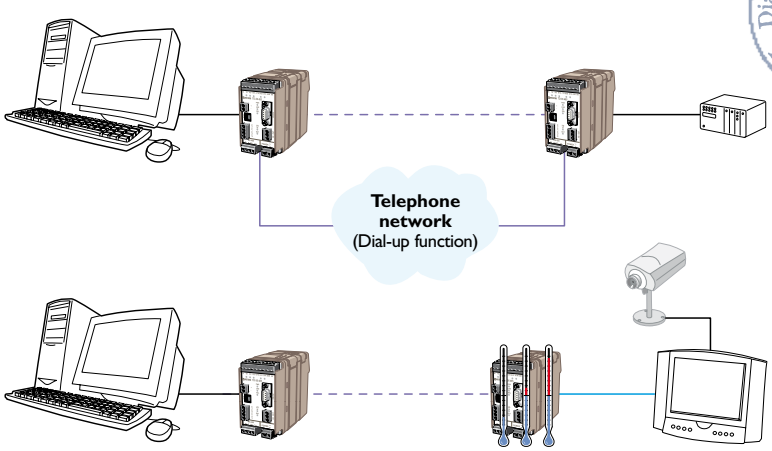
Telephone modem, RS-232 / RS-422/485

The TD-36 485 is designed to function reliably within industrial environments and in areas of high level interference. The modem has an RS-232 and RS-422/485 interface supporting terminal data rates up to 115 kbit/s. The TD-36 485 is a V.34 modem meaning that it can support bidirectional data rates of up to 33.6 kbit/s on the PSTN or leased line side. Fast connect ensures that leased lines can re-establish connections in the range of 5 seconds.

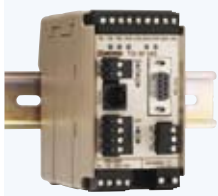
The modem is equipped with transient protection on the line side and a "watchdog" that monitors and automatically resets the modem in the event of a fault. These functions together with remote configuration make the modem perfect for installation at unmanned sites and prevent the need of costly service trips. The modem also has password protection, dial-back security and caller ID answering to ensure that only authorised users can communicate with the modem and any connected equipment.

The TD-36 485 also has a single digital input and output relay. The input and output can be used to trigger, or be triggered by a number of different user defined events. Both the digital input and output are galvanically isolated from the rest of the modem.

For ease of setup the modem is supported by the Westermo TD-tool configuration software but also has DIP switches to assist configuration. Drivers for Windows setup are also supplied.



- Extended temperature range –25°C to +70°C
- Data rate up to 33.6 kbit/s with Fast Connect
- Terminal rate up to 115.2 kbit/s
- 2-/4-wire leased line
- V.23 FDX/HDX with multidrop
- DTR and incoming data dialling
- DIP-switch configuration
- Secure call back and access
- Dial backup for Leased Line using PSTN
- Industrial environment transient protection on all interfaces
- Up to 11 data bits
- Tri-Galvanic isolation (interface/line/supply)
- RS-422 / RS-485 interface. Digital I/O
- Caller ID presentation and answering
- Remote configuration



- Extended temperature range –25°C to +70°C
- Data rate up to 33.6 kbit/s with Fast Connect
- Terminal rate up to 115.2 kbit/s
- 2-/4-wire leased line
- V.23 FDX/HDX with multidrop
- DTR and incoming data dialling
- DIP-switch configuration
- Secure call back and access
- Dial backup for PSTN and Leased Line
- Industrial environment transient protection on all interfaces
- Up to 11 data bits
- Tri-Galvanic isolation (interface/line/supply)
- RS-232 and RS-422 / RS-485 interface
- Caller ID presentation and answering
- Remote configuration

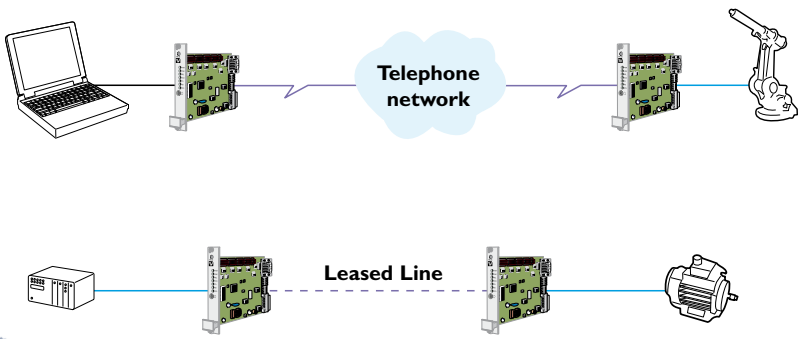
TR-36

Telephone modem, RS-232 / RS-422/485

The TR-36 is a rack based modem designed to meet industry demand for reliability and functionality in environments with high levels of electrical interference. The RV-07 (19" rack) can be fitted with up to 17 TR-36 modems, which makes it ideal for use where numerous modems need to be installed in a central location (modem pool).

The TR-36 is a V.34 modem meaning that it can support bidirectional data rates of up to 33.6 kbit/s on the PSTN or leased line side. Fast connect is a special feature that ensures leased lines can re-establish connections in about 5 seconds. The modem is equipped with transient protection on the line side and a "watchdog" that monitors and automatically resets the modem in the event of a fault. These functions together with remote configuration make the modem perfect for installation at unmanned sites and prevent the need for costly service trips. The modem also has password protection, dial-back security and caller ID answering to ensure that only authorised users can communicate with the modem and any connected equipment.

For ease of setup the modem is supported by the Westermo TD-tool configuration software and also has DIP switches to assist configuration. Drivers for Windows setup are also supplied.



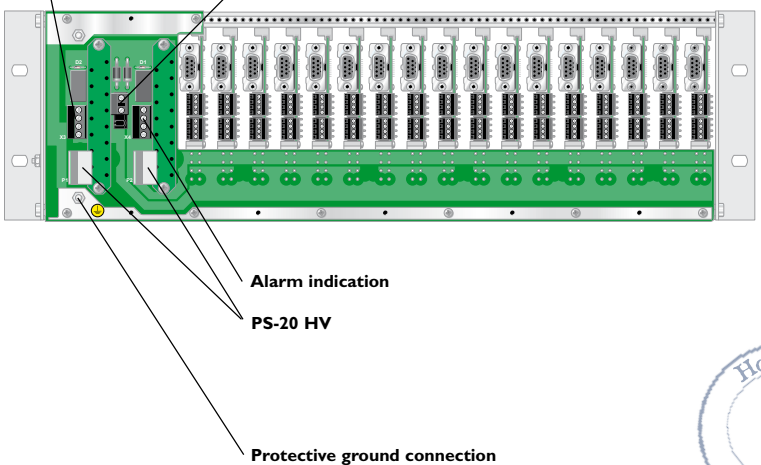
RV-07

19" rack

V-07 is a 19" rack that can be equipped with up to 17 telephone modems, TR-36, which makes it ideal for use where numerous modems need to be installed in the same place (modem pool). The rack can be equipped with two power supply units, (PS-20) where one can be used as a redundant power supply for the modems. It is also possible to connect an external alarm function that indicates/signals when the rack is dead.

The rack can also be powered by an external 24 VDC power source. A individual modem can be exchanged during operations without disconnecting the voltage, "Hot Swap" function.

- Can be equipped with up to 17 modems
- External alarm management in the event of a power failure
- Possibility of a redundant supply (PS-20)
- "Hot Swap" function
- 24 VDC external supply



- Extended temperature range –25°C to +70°C
- Data rate up to 56 kbit/s (V90)
- Terminal rate up to 115.2 kbit/s
- DTR and incoming data dialling
- Watchdog
- Secure call back and access
- Industrial environment transient protection on all interfaces
- Up to 11 data bits
- Tri-Galvanic isolation (interface/line/supply)
- Caller ID presentation and answering
- Remote configuration

TDW-33

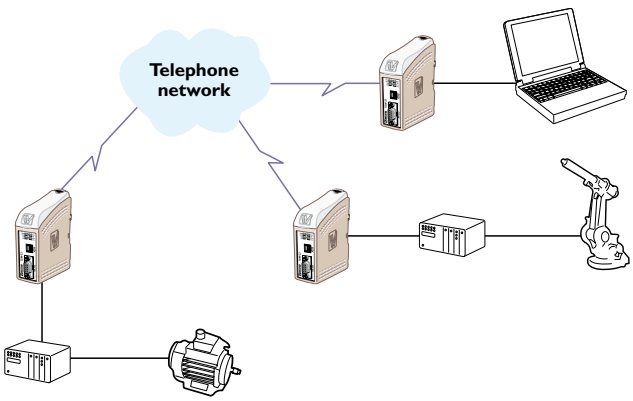
Telephone modem, RS-232

The TDW-33 is designed to function reliably within industrial environments and in areas of high level interference. The modem has an RS-232 interface supporting terminal data rates up to 115 kbit/s. The TDW-33 is a V.90 modem meaning that it can support data rates of up to 56 kbit/s on the PSTN line side.

The modem is equipped with transient protection on the line side and a "watchdog" that monitors and automatically resets the modem in the event of a fault. These functions together with remote configuration make the modem perfect for installation at unmanned sites and prevent the need of costly service trips.

The modem also has password protection, dial-back security and caller ID answering to ensure that only authorised users can communicate with the modem and any connected equipment.

The TDW-33 is ideal for industrial applications as it mounts easily on to a 35 mm DIN-rail, runs from 12–48 VDC power supplies, has screw terminal connections and is tri galvanically isolated.



IDW-90

ISDN-adapter

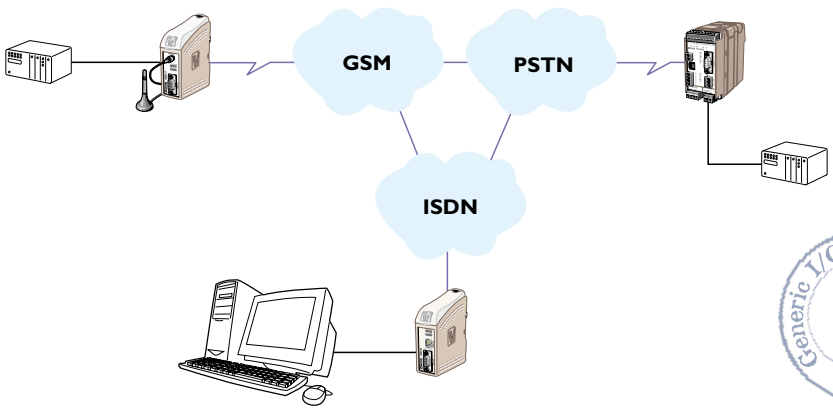
The Westermo IDW-90 industrial ISDN Terminal adapter has been developed with high speed industrial data communications inmind. IDW-90 supports both an RS-232 and RS-422/485 interfaces. The IDW-90 has been designed to meet the European ISDN standard DSS1. All standard ISDN transport protocols are supported including HDLC transparent, V.110 asynchronous, X75, PPP and ML-PPP.

The unit has one digital opto-coupled input that can be used to trigger services. The IDW-90 has also a relay output with NO-NC contact. The relay output can be controlled from a remote Westermo modem (PSTN, GSM and ISDN).

The IDW-90 features configuration with DIP-switch, AT-commands, and a Configurator for local as well as remote configuration. A supporting Windows based configuration tool is also available.

The IDW-90 is also has an internal analogue V34 modem enabling connections from ISDN to analogue modem end locations. The combination of analogue and ISDN modem and V.110 protocol support makes the IDW 90 especially suited for mixed environments there an ISDN connected modem shall be reached from ISDN, analogue and GSM networks.

- Connection to analogue telephone modems
- DTE data rate up to 230 kbit/s
- ISDN data rate up to 128 kbit/s (ISDN)
- Analogue data rate up to 33.6 kbit/s (V.34)
- ISDN leased line support
- Generic I/O inputs and Relay output
- DTR/TX and I/O event trigged dialling
- Secure connection and dial-back
- Remote configuration
- Configuration by DIP-switches
- Event trigged SMS-message transmission.
- Industrial and railway level of protection
- Polarity independent AC-/DC-supply
- Galvanic isolation (Power supply- ISDN – I/O – Serial interfaces)
- Built in watchdog



- Data rate 1200 bit/s (V.23)
- 2-wire (half duplex), 4-wire (full duplex)
- Number of multi-drop points, 16
- (typical value)
- Transmission distance up to 25 km
- (15.5 miles)
- Adjustable out-put signal level
- Adjustable recep-tion sensitivity
- Transient protection on the line side
- AC-/DC-supply
- Tri-Galvanic isolation (interface/line/supply)
- Optional relay out-put reflecting the transmitter carrier

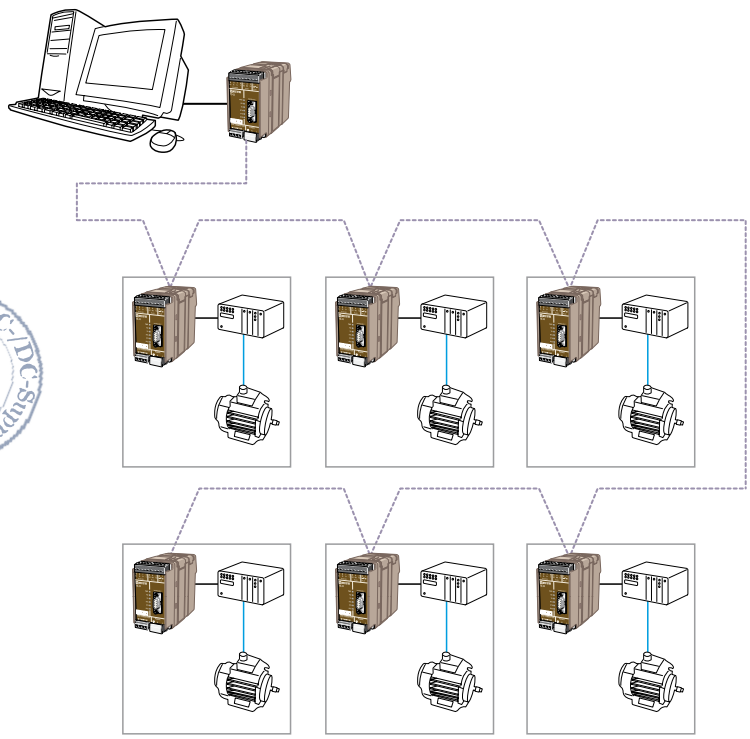
TD-23

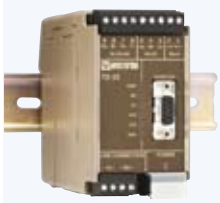
Multidrop modem (V.23)

TD-23 is designed to satisfy industry's demands on reliability and functionality in environments with high levels of interference. TD-23 communicates via a 2- or 4-wire leased line according to the V.23 standard. Equipment with an RS-232 or RS-422/485 interface can be connected and communicate point-to-point or in a multidrop application. The modem is equipped with DIP-switches to set specific functions in hardware, for example, reception sensitivity, output signal level, etc.

This is of particular importance as it allows each modem to be optimized according to the line quality. A general calculation allows 16 units over a distance of up to 25 km (15.5 miles).

TD-23 is intended for mounting on a 35 mm DIN-rail, where the modem is attached and locked in a single action.





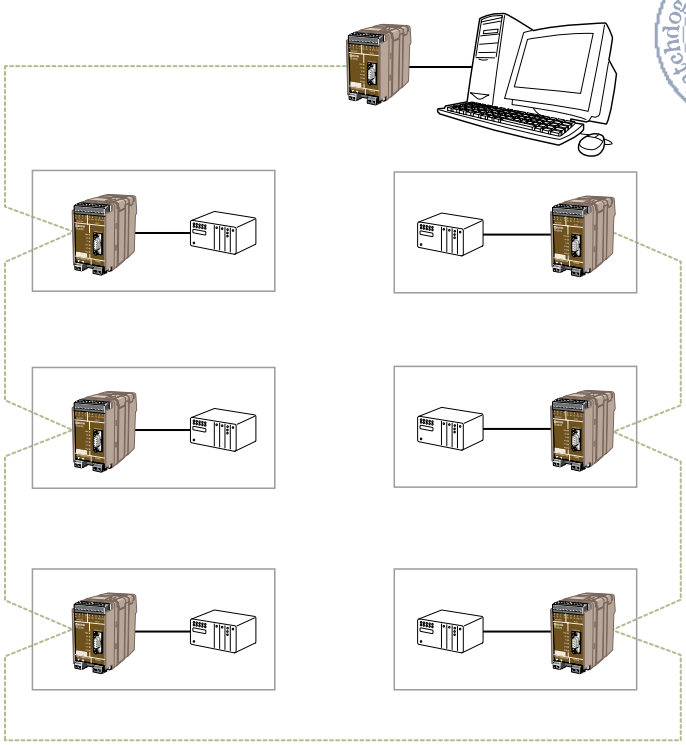
TD-29

Multidrop modem (Dedicated Lines)

TD-29 is designed to satisfy industry's demands on reliability and functionality in environments with high levels of interference. TD-29 is intended for half duplex communications via a 2-wire dedicated line. Equipment with an RS-232 or RS-422/485 interface can be connected and communicate point-to-point or in a multidrop application. Data rates up to 19.2 kbit/s are possible over distances of up to 10 km (6.2 miles). The transmission distance and number of multidrop points are affected by the number of connected modems and line quality. A typical value is 10 units up to 10 km (6.2 miles) at a transfer rate of 9600 bit/s.

TD-29 is intended for use on dedicated lines and must not be connected to general or leased telecom lines. TD-29 is intended for mounting on a 35 mm DIN-rail, where the modem is attached and locked in a single action.

- Data rate up to 19.2 kbit/s
- Number of multidrop points, 10 (typical value at 9600 bit/s)
- Transmission distance up to 10 km (6.2 miles)
- Watchdog
- Transient protection on the line side
- AC-/DC-supply
- Tri-Galvanic isolation (interface/line/supply)
- 2-wire half duplex



Technical Data

Power				
Rated voltage	**TD-36 AV**	18 to 250 VDC 22 to 240 VAC	**TD-23 LV**	12 to 48 VDC 12 to 27 VAC
	TD-36 LV	12 to 48 VDC 12 to 27 VAC	**TD-23 HV**	60 to 250 VDC 95 to 240 VAC
	TDW-33 LV	12 to 48 VDC 12 to 27 VAC	**TD-29 AC**	230 VAC
	IDW-90	12 to 48 VDC 12 to 34 VAC	**TD-29 DC**	24 VDC
			TD-29 36 – 55 DC	48 VDC
Operating voltage	**TD-36 AV**	16 to 300 VDC 20 to 264 VAC	**TD-23 LV**	10 to 60 VDC 10 to 30 VAC
	TD-36 LV	10 to 60 VDC 10 to 30 VAC	**TD-23 HV**	48 to 300 VDC 85.5 to 264 VAC
	TDW-33 LV	12 to 48 VDC 12 to 34 VAC	**TD-29 AC**	207 to 264 VAC
	IDW-90	10 to 60 VDC 10 to 42 VAC	**TD-29 DC**	12 to 36 VDC
			TD-29 36 – 55 DC	36 to 55 VDC
Rated current	**TD-36 AV**	125 mA @ 16 VDC 15 mA @ 110 VDC 8 mA @ 250 VDC 120 mA @ 22 VAC 35 mA @ 95 VAC 28 mA @ 240 VAC	**TD-23 LV**	125 mA @ 12 VDC 50 mA @ 24 VDC 28 mA @ 48 VDC 125 mA @ 12 VAC 50 mA @ 24 VAC 25 mA @ 32 VAC
	TD-36 LV	150 mA @ 12 VDC 70 mA @ 24 VDC 40 mA @ 48 VDC 150 mA @ 12 VAC 70 mA @ 24 VAC	**TD-23 HV**	10 mA @ 110 VDC 7 mA @ 250 VDC 20 mA @ 95 VAC 15 mA @ 240 VAC
	TDW-33 LV	150 mA @ 12 VDC 70 mA @ 24 VDC 40 mA @ 48 VDC 150 mA @ 12 VAC 70 mA @ 24 VAC	**TD-29 AC**	12 mA
	IDW-90	110 mA @ 12 VDC 55 mA @ 24 VDC 30 mA @ 48 VDC	**TD-29 DC**	200 mA
			TD-29 36 – 55 DC	50 mA
Rated frequency	DC: – AC: 48 to 62 Hz			

RV-07

Power RV-07, 17 pcs TR-36, PS-20 HV	
Power supply	110 – 250 VDC +10 / –10% 115/230 VAC +15 / –10%
Power consumption	500/240 mA, 50W
Rated frequency	DC: – AC: 48 – 62 Hz
Fuse, F1	4 AS 5 x 20 mm
Isolation to	All other ports 3 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal
Shielded cable	Not required

Power RV-07, 17 pcs TR-36, ext 24 VDC	
Power supply	24 VDC
Power consumption	34 W
Rated frequency	DC
Isolation to	All other ports 1.5 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal**
Shielded cable	Not required

* Direction relative this unit

** Maximum wire length to external power supply < 10 m.

Public Switched Telephone Network (PSTN) (Not availible for TD-29 and TD-23)			
Electrical specification	Public Switched Telephone Network		
Data rate	300 bit/s – 33.6 kbit/s		
Protocol	Bell103, Bell212, V.21, V.22, V.22Bis, V.23C, V.32, V.32Bis, V.34		
Protection	Installation Fault Tolerant (up to ±60 V)		
Isolation to	**TD-36**	Power port	3 kV_{rms} 50 Hz 1 min
		Leased line	2 kV_{rms} 50 Hz 1 min
		RS-232	2 kV_{rms} 50 Hz 1 min
		RS-485	2 kV_{rms} 50 Hz 1 min
		I/O	2 kV_{rms} 50 Hz 1 min
	TDW-33	Power port	3 kV_{rms} 50 Hz 1 min
		RS-232	2 kV_{rms} 50 Hz 1 min
	TR-36	Power port	3 kV_{rms} 50 Hz 1 min
		Leased line	2 kV_{rms} 50 Hz 1 min
		RS-232	2 kV_{rms} 50 Hz 1 min
		RS-485	2 kV_{rms} 50 Hz 1 min
Connection	**TD-36:** RJ-11C and detachable screw terminal **TDW-33:** RJ-11C **TR-36:** Detachable screw terminal		
Connector size	Detachable screw terminal 0.2 – 2.5 mm^2 (AWG 24 – 12)		
Shielded cable	Not required		

Leased Line (LL)			
Electrical specification	2- or 4-wire Leased Line (TD-29 2-wire only)		
Data rate	**TD-36, TDW-33, TR-36:** 300 bit/s – 33.6 kbit/s **TD-29:** 2.4 – 19.2 kbit/s **TD-23:** Up to 1200 bit/s		
Protocol	**TD-36, TDW-33, TR-36:** Bell103, Bell212, V.21, V.22, V.22Bis, V.23C, V.32, V.32Bis, V.34 **TD-29:** FSK **TD-23:** V.23		
Transmission range/Budget	Leased Line max 40 dB (TD-29 35dB)		
Protection	Installation Fault Tolerant (up to ±60 V)		
Isolation to	**TD-36**	Power port	3 kV_{rms} 50 Hz 1 min
		PSTN line	2 kV_{rms} 50 Hz 1 min
		RS-232	2 kV_{rms} 50 Hz 1 min
		RS-485	2 kV_{rms} 50 Hz 1 min
		I/O	2 kV_{rms} 50 Hz 1 min
	TD-23	Power port	3 kV_{rms} 50 Hz 1 min
		RS-232	2 kV_{rms} 50 Hz 1 min
		RS-485	2 kV_{rms} 50 Hz 1 min
	TR-36	Power port	3 kV_{rms} 50 Hz 1 min
		PSTN line	2 kV_{rms} 50 Hz 1 min
		RS-232	2 kV_{rms} 50 Hz 1 min
		RS-485	2 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal		
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)		
Shielded cable	Not required		

RS-422/485	
Electrical specification	EIA/TIA-485 ITU V.11 2-wire or 4-wire twisted pair
Data rate	**TD-36 485** 300 bit/s – 115.2 kbit/s. **TR-36** 300 bit/s – 115.2 kbit/s **IDW-90** 300 bit/s – 115.2 kbit/s **TD-23** Up to 1200 kbit/s **TD-29** 2400 bit/s – 19.2 kbit/s
Data format	7 or 8 data bits, Odd, even or none parity, 1 or 2 stop bits. Σ 9–12 bit words
Protocol	Transparent
Re-timing	Yes
Turn around time	≤10 µs (half duplex)
Transmission range	≤1200 m, depending on data rate and cable type (EIA RS-485)
Settings	120 Ω termination and failsafe biasing 680 Ω
Isolation to	**TD-36 485** Power port 3 kV_{rms} 50 Hz 1 min PSTN line 2 kV_{rms} 50 Hz 1 min Leased Line 2 kV_{rms} 50 Hz 1 min I/O 2 kV_{rms} 50 Hz 1 min **TR-36** Power port 3 kV_{rms} 50 Hz 1 min PSTN line 2 kV_{rms} 50 Hz 1 min Leased Line 2 kV_{rms} 50 Hz 1 min **IDW-90** Power port 3 kV_{rms} 50 Hz 1 min ISDN line 2 kV_{rms} 50 Hz 1 min I/O 2 kV_{rms} 50 Hz 1 min **TD-23** Power port 3 kV_{rms} 50 Hz 1 min Leased Line 2 kV_{rms} 50 Hz 1 min **TD-29 AC** Power port 3 kV_{rms} 50 Hz 1 min RS-232 2 kV_{rms} 50 Hz 1 min FSK-line 1.5 kV_{rms} 50 Hz 1 min **TD-29 DC** Power port 1 kV_{rms} 50 Hz 1 min RS-232 2 kV_{rms} 50 Hz 1 min FSK-line 1.5 kV_{rms} 50 Hz 1 min
Protection	Installation Fault Tolerant (up to ±60 V)
Connection	Detachable screw terminal
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required*
Miscellaneous	Do not connect RS-232 and RS-422/485 simultaneously

* Railway installation close to the rails.
For a cable located within 3 m and connected to this port, the use of shielded cable is recommended, this is to minimise the risk of interference. The cable shield should be properly connected (360°) to an earthing point within 1 m of this port. This earthing point should have a low impedance connection to the conductive enclosure of the apparatus cabinet, or similar, where the unit is built-in. This conductive enclosure should be connected to the earthing system of an installation and may be directly connected to the protective earth.

RS-232		
Electrical specification	EIA/TIA-232	
Data rate	**TD-36**	300 bit/s – 115.2 kbit/s
	TR-36	300 bit/s – 115.2 kbit/s
	TDW-33	300 bit/s – 115.2 kbit/s
	IDW-90	300 bit/s – 115.2 kbit/s
	TD-23	Up to 1200 bit/s
	TD-29	2400 bit/s – 19.2 kbit/s
Data format	7 or 8 data bits, Odd, even or none parity, 1 or 2 stop bits. 9–12 bit words	
Protocol	Transparent	
Re-timing	**TD-36**	Yes
	TR-36	Yes
	TDW-33	Yes
	IDW-90	Yes
	TD-23	No
	TD-29	No
Transmission range	Cable length ≤ 15 m	
Isolation to	**TD-36**	Power port 3 kV_{rms} 50 Hz 1 min
		PSTN line 2 kV_{rms} 50 Hz 1 min
		Leased line 2 kV_{rms} 50 Hz 1 min
		RS-485 2 kV_{rms} 50 Hz 1 min
		I/O 2 kV_{rms} 50 Hz 1 min
	TR-36	Power port 3 kV_{rms} 50 Hz 1 min
		PSTN line 2 kV_{rms} 50 Hz 1 min
		Leased line 2 kV_{rms} 50 Hz 1 min
		RS-485 2 kV_{rms} 50 Hz 1 min
	TDW-33	Power port 3 kV_{rms} 50 Hz 1 min
		PSTN line 2 kV_{rms} 50 Hz 1 min
	IDW-90	Power port 3 kV_{rms} 50 Hz 1 min
		ISDN line 2 kV_{rms} 50 Hz 1 min
		I/O 1.5 kV_{rms} 50 Hz 1 min
	TD-23	Power port 3 kV_{rms} 50 Hz 1 min
		Leased Line 2 kV_{rms} 50 Hz 1 min
	TD-29 AC	Power port 3 kV_{rms} 50 Hz 1 min
		Leased line 2 kV_{rms} 50 Hz 1 min
		RS-485 2 kV_{rms} 50 Hz 1 min
	TD-29 DC	Power port 1 kV_{rms} 50 Hz 1 min
		Leased line 2 kV_{rms} 50 Hz 1 min
		RS-485 2 kV_{rms} 50 Hz 1 min
Connection	9-pin D-sub female (DCE) and Detachable screw terminal (DCE)	
Connector size	0.2 – 2.5 mm^2 (AWG 24 – 12)	
Shielded cable	Not required*	
Miscellaneous	Do not connect RS-232 and RS-422/485 simultaneously	

Generic I/O interface Relay Output TD-36 485	
Electrical specification	One change over contact
Switching voltage	Max 40 VAC/DC
Switching current	Max 500 mA AC/DC
Electrical endurance	5 x 10^5 operations at 20 W / 20 VA Resistive load
Re-timing	Yes
Transmission range	Cable length ≤ 15 m
Isolation to	Power port 3 kV_{rms} 50 Hz 1 min Leased Line 2 kV_{rms} 50 Hz 1 min RS-232 2 kV_{rms} 50 Hz 1 min RS-485 2 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal (DCE)
Connector size	Detachable screw terminal 0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required*

Generic I/O interface Input TD-36 485	
Electrical specification	Opto isolated input
Input voltage range	0 – 60 VDC
Input current	5 mA @ 60 VDC
Input inactive Input active	U_{in} < 2.5 V U_{in} < 5.0 V
Re-timing	Yes
Transmission range	Cable length ≤ 15 m
Isolation to	Power port 3 kV_{rms} 50 Hz 1 min Leased Line 2 kV_{rms} 50 Hz 1 min RS-232 2 kV_{rms} 50 Hz 1 min I/O output 2 kV_{rms} 50 Hz 1 min
Connection	Detachable screw terminal (DCE)
Connector size	Detachable screw terminal 0.2 – 2.5 mm^2 (AWG 24 – 12)
Shielded cable	Not required*

Type tests and environmental conditions

Electromagnetic Compatibility			
Phenomena	**Test**	**Description**	**Level**
ESD	EN 61000-4-2	Enclosure contact	± 6 kV
		Enclosure air	± 8 kV
RF field AM modulated	IEC 61000-4-3	Enclosure	10 V/m 80% AM (1 kHz), 80 – 1000 MHz 20 V/m 80% AM (1 kHz), 80 – 2000 MHz
RF field 900 MHz	ENV 50204	Enclosure	20 V/m pulse modulated 200 Hz, 900 ± 5 MHz
Fast transient	EN 61000-4-4	Signal ports	± 2 kV
		Power ports	± 2 kV
Surge	EN 61000-4-5	Signal ports unbalanced	± 2 kV line to earth, ± 2 kV line to line
		Signal ports balanced	± 2 kV line to earth, ± 1 kV line to line
		Power ports	± 2 kV line to earth, ± 2 kV line to line
RF conducted	EN 61000-4-6	Signal ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
		Power ports	10 V 80% AM (1 kHz), 0.15 – 80 MHz
Power frequency magnetic field	EN 61000-4-8	Enclosure	100 A/m, 50 Hz, 16.7 Hz & 0 Hz
Pulse Magnetic field	EN 61000-4-9	Enclosure	300 A/m, 6.4 / 16 µs pulse
Voltage dips and interruption	EN 61000-4-11	AC power ports	10 & 5 000 ms, interruption 10 & 500 ms, 30% reduction 100 & 1 000 ms, 60% reduction
Mains freq. 50 Hz	EN 61000-4-16	Signal ports	100 V 50 Hz line to earth
Mains freq. 50 Hz	SS 436 15 03	Signal ports	250 V 50 Hz line to line
Voltage dips and interruption	EN 61000-4-29	DC power ports	10 & 100 ms, interruption 10 ms, 30% reduction 10 ms, 60% reduction +20% above & –20% below rated voltage
Radiated emission	EN 55022	Enclosure	Class B
	FCC part 15		Class B
Conducted emission	EN 55022	AC power ports	Class B
	FCC part 15	AC power ports	Class B
	EN 55022	DC power ports	Class B
Dielectric strength	EN 60950	Signal port to all other isolated ports	2 kVrms 50 Hz 1min
		Power port to other isolated ports	3 kV_{rms} 50 Hz 1min 2 kV_{rms} 50 Hz 1min (@ rated power < 60V)
Environmental			
Temperature		Operating	**TD-36, TDW-33, TD-23:** –40 to +70°C **IDW-90, TD-29:** –5 to +55°C **TR-36:** 0 to +50°C
		Storage & Transport	–40 to +70°C
Humidity		Operating	5 to 95% relative humidity non condensing
		Storage & Transport	5 to 95% relative humidity non condensing
Altitude		Operating	2 000 m / 70 kPa
Reliability prediction (MTBF)	MIL-HDBK- 217F	Operating	
Service life		Operating	10 year
Vibration	IEC 60068-2-6	Operating	7.5 mm, 5 – 8 Hz 2 g, 8 – 500 Hz
Shock	IEC 60068-2-27	Operating	15 g, 11 ms
Packaging			
Enclosure	UL 94	PC / ABS	Flammability class V-1
Dimension W x H x D			**TDW-33, IDW-90:** 35 x 121 x 119 mm **TD-36, TD-29, TD-23:** 55 x 100 x 132 mm **TR-36:** 485 x 135 x 180 mm
Weight			**TD-36:** 0.36 kg, **TDW-33:** 0.21 kg **TD-23, IDW-90:** 0.25 kg, **TD-29:** 0.5 kg **TR-36:** 0.14 kg, 17 x **TR-36+RV-07**+2 x PS-20 4 kg
Degree of protection			**TD-36, TD-23, TD-29, TR-36:** IP 20 **TDW-33, IDW-90:** IP 21
Cooling	IEC 529	Enclosure	Convection
Mounting			Horizontal on 35 mm DIN-rail

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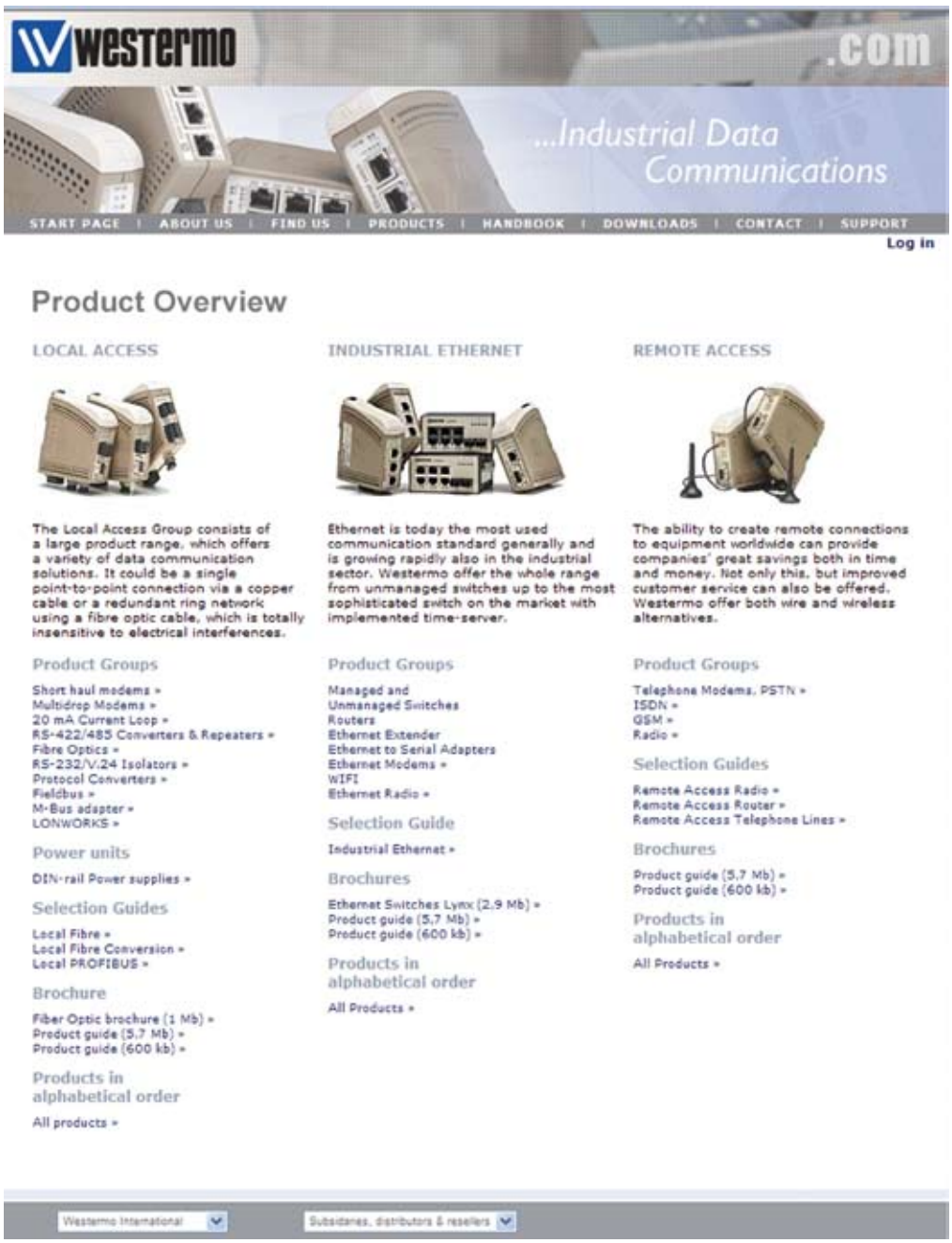
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